

REMARKS

The Applicants thank the Examiner for the thorough examination of the application. No new matter is believed to be added to the application by this Amendment.

Status of the Claims

Claims 1, 3, 6-13, 15-18, 22 and 23 are pending in the application. Claims 1, 3, 6-13 and 15-18 are allowed. Claims 22 and 23 are rejected.

Rejection Under 35 U.S.C. §103(a) based On Lyu

Claims 22 and 23 are rejected under 35 U.S.C. § 103(a) as being obvious over the Lyu (U.S. Patent 6,001,539) in view of Tran (U.S. Patent 5,135,581), Carter (U.S. Patent 5,628,933) and Kaneko (U.S. Patent 6,433,842). Applicants traverse.

The present invention pertains to a process for forming a pixel electrode in a liquid crystal display where the pixel electrode has an amorphous structure. Although the present invention has many embodiments, a typical embodiment can be found in claim 22:

22. A method of fabricating a pixel electrode in a liquid crystal display including a switching device for driving the pixel electrode, the method comprising:

depositing a protective film over a substrate to cover the switching device;

defining a contact hole in the protective film to expose one electrode of the switching device; and

forming the pixel electrode connected, via the contact hole, to said one exposed electrode, wherein the pixel electrode is formed by placing the substrate in a vacuum chamber and injecting hydrogen-containing gas at a temperature of less than about 400 °C, and the substrate has a temperature of less than about 200 °C when forming the pixel electrode, the temperature of the substrate corresponding to half a set temperature of the vacuum chamber, and the pixel electrode has an amorphous structure.

Another typical embodiment of the present invention is set forth in claim

23:

23. A pixel electrode in a liquid crystal display, which comprises:
a substrate;

a switching device over the substrate;

a protective film over a substrate covering the switching device; and

a contact hole in the protective film, the contact hole exposing one electrode of the switching device, the pixel electrode being connected, via the contact hole, to said one exposed electrode, wherein the pixel electrode is formed by placing the substrate in a vacuum chamber and injecting hydrogen-containing gas at a temperature of less than about 400 °C, and the substrate has a temperature of less than about 200 °C when forming the pixel electrode, the temperature of the substrate corresponding to half a set temperature of the vacuum chamber, and the pixel electrode has an amorphous structure.

Distinctions of the invention over Lyu, Tran, Carter and Kaneko have been placed before the Examiner and made of record in the application in previous responses. For brevity, these distinctions are not fully repeated here.

In the Office Action, the Examiner makes unequivocal admissions of the failures of the cited art. At page 3, lines 7-11 of the Office Action, the Examiner states:

Lyn does not explicitly disclose that:

- 1) the pixel electrode is formed by placing the substrate in a vacuum chamber and injecting hydrogen gas at a temperature of less than 400°C, and the substrate has a temperature of less than about 200°C when forming the pixel electrode;
- 2) the pixel electrode has an amorphous structure.

At page 3, lines 16-17 of the Office Action the Examiner admits to the failure of Tran to disclose the location of the substrate, stating: "Inherently, the substrate must be placed in a vacuum chamber."

Further, at page 4, lines 18-20, the Examiner states: "Lyn, Tran and Cater teach the invention set forth [sic] above except for the pixel electrode has an amorphous structure and the pixel electrode is etched with a weak acid etchant."

Nonetheless, at page 5 of the Office Action, the Examiner asserts that the combination of Lyn with Tran, Cater and Kaneko would make the present invention obvious to one of ordinary skill.

However, in the Response to Arguments at page 6 of the Office Action, the Examiner fails to appreciate the temperature relationships of the present invention. At page 6, lines 12-13 the Examiner mentions (in relation to Tran): “sputtering at temperature from 20°C to 300°C (less than 400°C).” At page 6, lines 16-18, the Examiner asserts: “Less than 400°C can be any degree as long as less than 400°C and less than 200°C can be any degree as long as less than 200°C.”

However, claims 22 and 23 set forth a temperature relationship that is neither disclosed nor suggested by the cited art references: “injecting hydrogen-containing gas at a temperature of less than about 400 °C, and the substrate has a temperature of less than about 200 °C when forming the pixel electrode, the temperature of the substrate corresponding to half a set temperature of the vacuum chamber.”

That is, the Examiner fails to point out any teaching or suggestion of the temperature of the substrate being set to half (or less than half) the set temperature of the vacuum chamber. The cited prior art thus fails to teach or suggest each and every element of claims 22 and 23.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). “All the words in a claim must be

considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

That is, none of the cited art (Lyu, Tran, Carter and Kaneko) alone or in combination teach or suggest the combination of temperature conditions set forth in independent claims 22 and 23. None of the cited art recognizes the advantages to be gained by exploiting the temperature differential between the substrate and the reaction chamber.

As a result, one having ordinary skill in the art would not be motivated by Lyu, Tran, Carter and Kaneko to produce the present invention set forth in independent claims 22 and 23. The necessity for the Examiner to utilize four references to allege obviousness is further evidence of the utilization of impermissible hindsight reconstruction (citations omitted). A *prima facie* case of obviousness has not been made over claims 22 and 23.

This rejection is overcome and withdrawal thereof is respectfully requested.

Conclusion

The Examiner’s rejections have been overcome. No issues remain. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability.

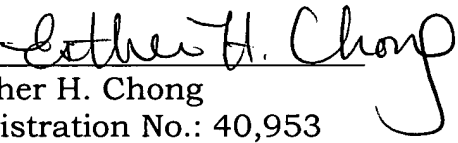
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert E. Goozner, Ph.D. (Reg. No. 42,593) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

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Respectfully submitted,

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